Name: _____   Date: _____
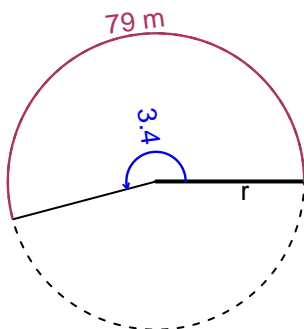
Trig Final (SLTN v681)

- You should have a calculator (like Desmos) and a unit-circle reference sheet.

Question 1

In the figure below, we see a circle and a central angle that subtends an arc. The arc length is 79 meters. The angle measure is 3.4 radians. How long is the radius in meters?
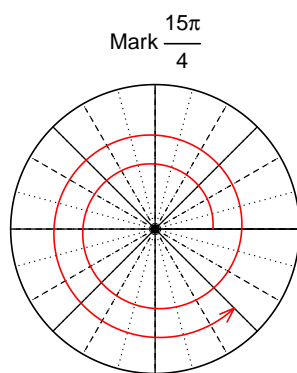

$$\theta = \frac{L}{r} \qquad r = \frac{L}{\theta} \qquad L = r\theta$$
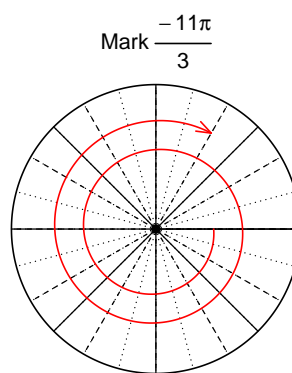
$r = 23.24$ meters.

Question 2

Consider angles $\frac{15\pi}{4}$ and $\frac{-11\pi}{3}$. For each angle, use a spiral with an arrow head to **mark** the angle on a circle below in standard position. Then, find **exact** expressions for $\cos\left(\frac{15\pi}{4}\right)$ and $\sin\left(\frac{-11\pi}{3}\right)$ by using a unit circle (provided separately).

Mark $\frac{15\pi}{4}$

Find $\cos(15\pi/4)$

Mark $\frac{-11\pi}{3}$

Find $\sin(-11\pi/3)$

$\cos(15\pi/4) = \frac{\sqrt{2}}{2}$
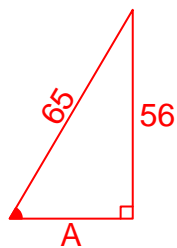
$\sin(-11\pi/3) = \frac{\sqrt{3}}{2}$

Question 3

If $\sin(\theta) = \frac{56}{65}$, and θ is in quadrant II, determine an exact value for $\cos(\theta)$.

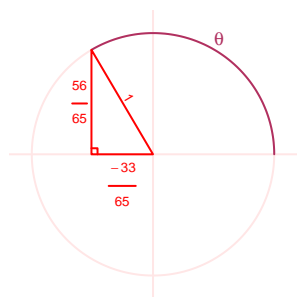Ignore any negatives and the quadrant, and draw a right triangle (based on SOHCAHTOA) in standard (quadrant I) orientation.

Solve the Pythagorean Equation

$$A^2 + 56^2 = 65^2$$
$$A = \sqrt{65^2 - 56^2}$$
$$A = 33$$

Rescale the triangle so the hypotenuse is 1. Reflect the triangle into Quadrant II in a unit circle.

$$\cos(\theta) = \frac{-33}{65}$$

Question 4

A mass-spring system oscillates vertically with an amplitude of 6 meters, a midline at $y = -2.96$ meters, and a frequency of 8.31 Hz. At $t = 0$, the mass is at the midline and moving down. Write an equation to model the height (y in meters) as a function of time (t in seconds).

Any of these equations would get full credit.

$$y = -6\sin(2\pi 8.31t) - 2.96$$

or

$$y = -6\sin(16.62\pi t) - 2.96$$

or

$$y = -6\sin(52.21t) - 2.96$$

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